Water quality monitoring in a recently refilled reservoir: the case of Bütgenbach

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Bütgenbach Reservoir (1932):
- is situated in the High Ardennes plateau (Eastern Belgium)
- lies on river Warche, a major tributary of the upper Amblève
- principal uses: hydroelectric energy supply, water storage and recreation
- case study: by the spring of 2004, it was emptied for dam restoration and was refilled in mid-September of the same year. For 6 months the lake bottom, without being extracted, was exposed to the open air and before refilling it looked like a meadow.

A monitoring of temperature, dissolved oxygen, pH, inorganic and organic nutrients, phytoplankton and zooplankton was carried out fortightly, during the productive season, at three sampling points throughout the water column in order to examine the new ecosystem established. The basic trends are compared to those of a previous study accomplished in 1995 before the lake emptying.

Here we present the results obtained from the deepest point. Point C is located in the proximity of the dam and constitutes a typical lacustrine zone. The main trends observed in 2005 compared to 1995 are the following:
- thermal stratification initiated earlier and seemed more persistent
- more intense anaerobic conditions (even anoxia) in the hypolimnion, as a consequence of degraded bottom vegetation that had not been removed during restoration works
- greater phosphate and nitrite accumulation in bottom waters, which was not the case for ammonium as expected
- chlorophyll a trends of the same magnitude but with shifted peaks
- summer release of unpleasant odour from bottom waters probably due to hydrogen sulfide formation in anaerobic conditions

**Perspectives**
- According to the literature, newly established ecosystems after refilling need some years’ time to be stabilized. A continuous monitoring of physicochemical parameters, combined with plankton (phyto- and zooplankton) as well as higher trophic levels including fish throughout the water column is therefore crucial.
- Further information from phyto- and zooplankton will enlighten the reservoir’s actual trophic status and interactions.
- The role of the purification station located upstream combined with the collecting network functioning, towards the nutrients’ input in the reservoir should be equally considered.

The results of the most preoccupant physicochemical variables are presented according to a quality evaluation system developed in France for the superficial waters (SEQ-eau). In a first approach, in 2005, point C showed a deterioration, maintaining though the good water quality standards of 1995 for the reduced forms of nitrogen and phosphates. However, oxygen displayed unsatisfactory water quality.

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Lac de Bütgenbach

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